

TECHNICAL MEMORANDUM

Date: April 16, 2019

BKF Job Number: 20160331-10

Deliver To: Sherry Liu
Geotech-Civil Section
County Of San Mateo

From: Mike O'Connell, PE

Subject: 1325 Old County Road Storm - Preliminary Drain Memo

INTRODUCTION

The proposed site, Artisan Crossing Project at 1325 Old County Road, is a 250 unit apartment building with a 1 story below-ground parking garage with 259 parking stalls. The following memorandum describes how the post-development peak flow and velocity are less than the pre-existing conditions. The analysis of the capacity of the existing storm drainage system that is downstream of the site from Elmer Street to Harbor Boulevard is also included in this memo.

This is a preliminary memo required for the Vesting Tentative Map approval. A final analysis storm drain report will be prepared for the construction documents phase.

PROJECT DESCRIPTION AND EXISTING CONDITIONS

The project site is located at 1325 Old County Road in the City of Belmont, California. The project site is bounded to the northwest by O'Neill Avenue, to the northeast by Elmer Street, to the southeast by Karen Road (Private Street) and to the southwest by Old County Road. The existing site (91,426 square-feet or 2.10 acres) comprises existing industrial buildings and parking lots and sheet flows to Elmer Street.

The project site does not have City of Belmont nor San Mateo County storm drain infrastructure located along the project frontage. The closest storm drain system to the project site is located on the northeast side of Elmer Street, approximately 166-feet from the project site, and is owned by San Mateo County. The project proposes to connect to this system.

Based on existing topography and the Harbor Boulevard Improvement Plans from 1967, attached as Exhibits A and B, the project site drains to the San Mateo County storm drain system located on Elmer Street. This system also collects street drainage and sheet flow from the adjacent properties on Elmer Street from O'Neill Avenue to Harbor Boulevard. The tributary drainage area, approximately 465,553 square-feet or 10.7 acres, is shown in Exhibit C.

The San Mateo County storm drain system located on Old County Road is collecting street drainage on Old County road from Waltermire Street to the old S.P.R.R. tracks based on existing topography and of the Old County Road Improvement Plans from 1957, attached as Exhibit D.

PRE-DEVELOPMENT CONDITIONS

Pre-development is defined by San Mateo County to be prior to any development. The pre-development site (91,426 square-feet or 2.10 acres) is assumed to be 100% pervious. The pre-development C coefficient is assumed to be 0.30 per the San Mateo County Rainfall Runoff Data for parks, attached as Exhibit D. The pre-development flow is calculated to be 1.23 cfs as shown below.

10 Year Pre-Development

Q=CIAF

Time of Concentration, T_c (min)	10
Rainfall Intensity, I (in/hr)	2.45
Rainfall Intensity Factor, F	0.8
Runoff Coefficient, C	0.3
<u>Pre-Development Flow, Q_{PRE} (cfs)</u>	<u>1.23</u>

Assumptions:

C factors for pervious area	0.30 per Runoff Coefficients Rainfall Runoff Data, San Mateo County
Rainfall intensity (10-year storm data)	2.45 with Intensity Factor of 0.8 per Rainfall Runoff Data, San Mateo County
Time of Concentration (T_c)	10 min, typical minimum time of concentration

PRE-EXISTING CONDITIONS

Pre-existing is defined by San Mateo County to be prior to this project's development. The existing site (91,426 square-feet or 2.10 acres) sheet flows to Elmer Street, Karen Road, and Old County Road. The existing site contains no pervious area.

The pre-existing C coefficient is assumed to be 0.85 per the San Mateo County Rainfall Runoff Data for paved areas. The pre-existing flow is calculated to be 3.50 cfs.

10 Year Pre-Existing

Q=CIAF

Time of Concentration, T_c (min)	10
Rainfall Intensity, I (in/hr)	2.45
Rainfall Intensity Factor, F	0.8
Runoff Coefficient, C	0.85
<u>Pre-Existing Flow, Q_{EX} (cfs)</u>	<u>3.50</u>

Assumptions:

C factors for paved areas	0.85 per Runoff Coefficients Rainfall Runoff Data, San Mateo County for paved areas
Rainfall intensity (10-year storm data)	2.45 with Intensity Factor of 0.8 per Rainfall Runoff Data, San Mateo County
Time of Concentration (T_c)	10 min, typical minimum time of concentration

PROPOSED CONDITIONS

The site includes 59,545 square-feet of roof, 23,466 square-feet of impervious paving, and 8,415 square-feet (or roughly 9.20% of the site) of pervious landscaping. The total impervious area is 83,011 square-feet. Runoff from a portion of the building roof will be directed to on-podium-flow through planters located within two building courtyards via roof downspouts. The rest of the roof drainage will be directed to a stormfilter prior to entering the storm drainage system. The project increases pervious area relative to the pre-existing condition, and so the runoff will decrease during the 10-year storm from 3.50 cfs to 3.29 cfs.

New catch basins in the Right-of-Way on the east and west sides of the proposed bulb outs on Old County Road are required so that runoff is not blocked by the bulb outs. The existing storm drain main will be attached to these catch basins. The proposed building does not connect to the Old County Road storm drain. The proposed storm drain improvements are shown in Exhibit E.

San Mateo County requires that projects detain the difference between the pre-development and post-development conditions during the 10-year storm. Approximately 1,854 cubic feet (13,868 gallons) of detention is required to meet these requirements. The required storage volumes were calculated using the City of Redwood City Design Criteria (the County guidelines do not include specific detention requirements) shown in Exhibit F. The final size of the detention cistern will be determined during the construction documents phase. The final size of the cistern will be based on working volume, equipment requirements, and headroom requirements. Flow will be metered out of the cistern once the storage volume has been exhausted.

Table 1 – Post-Development Weighted C Coefficient

Surface	C	Area	C*A	Percent
Impervious	0.85	83,011	70,559	90.8
Pervious	0.3	8,415	2,525	9.2
	Σ	91,426	73,084	
Weighted Ave.		$\Sigma(C*A)/\Sigma A$.80	

10 Year Post-Development

$Q = CIAF$

Time of Concentration, T_c (min)	10
Rainfall Intensity, I (in/hr)	2.45
Rainfall Intensity Factor, F	0.8
Runoff Coefficient (Weighted), C	0.8
<u>Post-Development Flow, Q_{PD} (cfs)</u>	<u>3.29</u>

Volume Stored

$$\text{Volume Stored} = (Q_{PD} - Q_{PRE}) * 1.5T_C$$

Post-Development Flow, Q_{PD} (cfs)	3.29
Pre-Development Flow, Q_{PRE} (cfs)	1.23
Pre-Existing Flow, Q_{EX} (cfs)	3.50
Time of Concentration, T_C (min)	10
Post-Development Stormwater Storage Volume (cf)	1,854
<u>Post-Development Stormwater Storage Volume (gal)</u>	<u>13,868</u>

Assumptions:

C factors for paved and park areas	0.85 and 0.30 per Runoff Coefficients Rainfall Runoff Data, San Mateo County
Rainfall intensity (10-year storm data)	2.45 with Intensity Factor of 0.8 per Rainfall Runoff Data, San Mateo County
Time of Concentration (T_C)	10 min, typical minimum time of concentration

EVALUTION OF EXISTING STORM DRAIN SYSTEM

Existing flows from the project site, adjacent properties, and street drainage on Elmer Street from O'Neill Avenue to Harbor Boulevard are captured in two catch basins on the northeast side of Elmer Street. The catch basin on the east end is connected to an 18-inch reinforced concrete pipe in an alley way that runs north from Elmer into a drain inlet at the eastern end of the alley. That drain inlet is connected to a 21-inch reinforced concrete pipe that flows to Harbor Boulevard where the pipe increases to 24-inches at the existing catch basin. Flow continues north to where it crosses Highway 101 and eventually discharges to Belmont Slough.

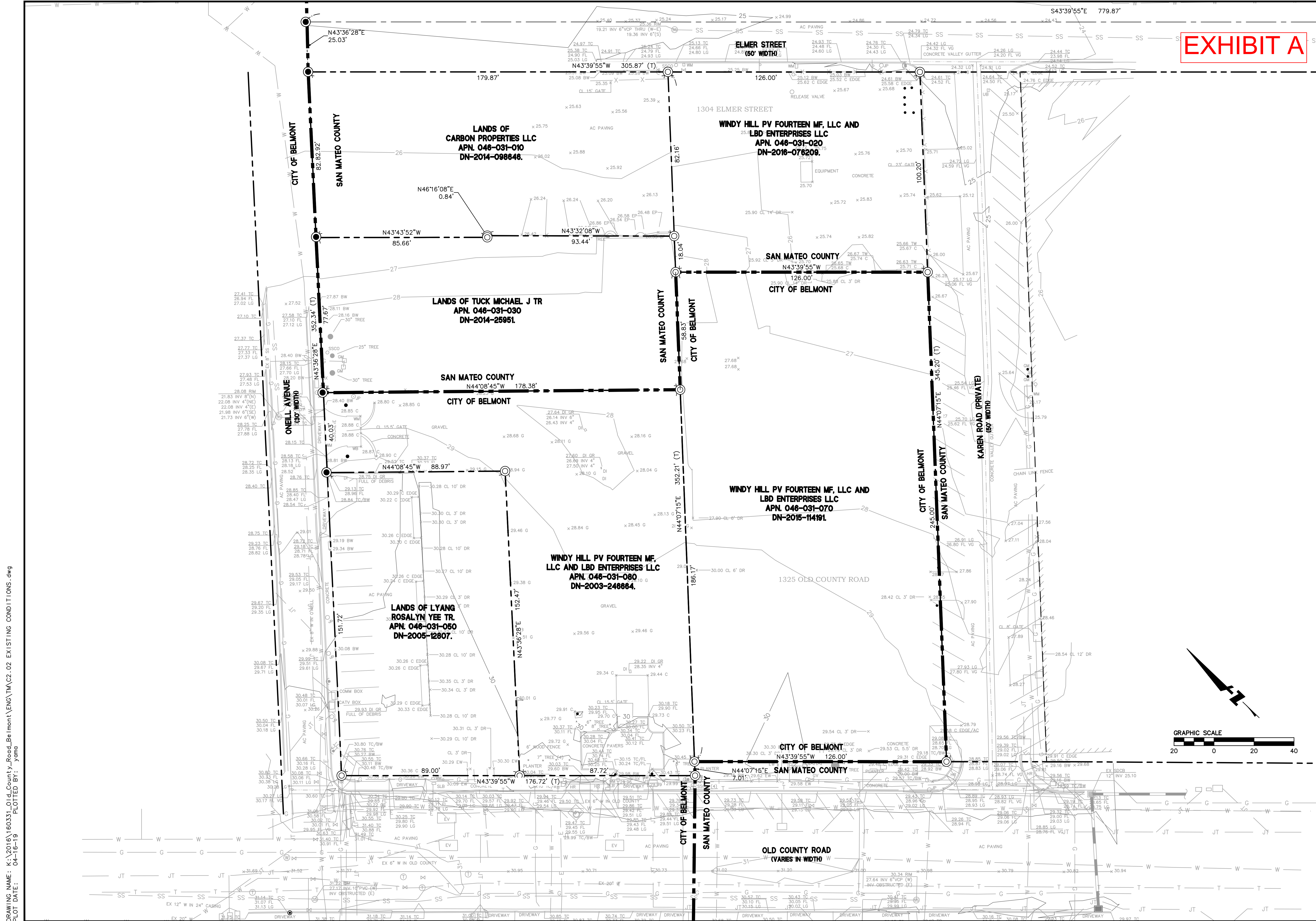
The capacity of the existing storm drainage system was calculated using the Rational Method. StormCAD was used to determine the peak discharge for the site and surrounding drainage areas to the system. Each Drainage Area time of concentration was assumed to be 10 minutes and a runoff coefficient factor (C) value of 0.85 was used in the analysis per the Runoff Coefficients Rainfall Runoff Data from San Mateo County, Exhibit G. The system assumed a free outfall condition. The profile and data from the analysis is attached as Exhibit H. The existing storm drain has adequate capacity to receive flow from the proposed development as the HGL is below the grate elevations relative to the pre-existing conditions.

SUMMARY

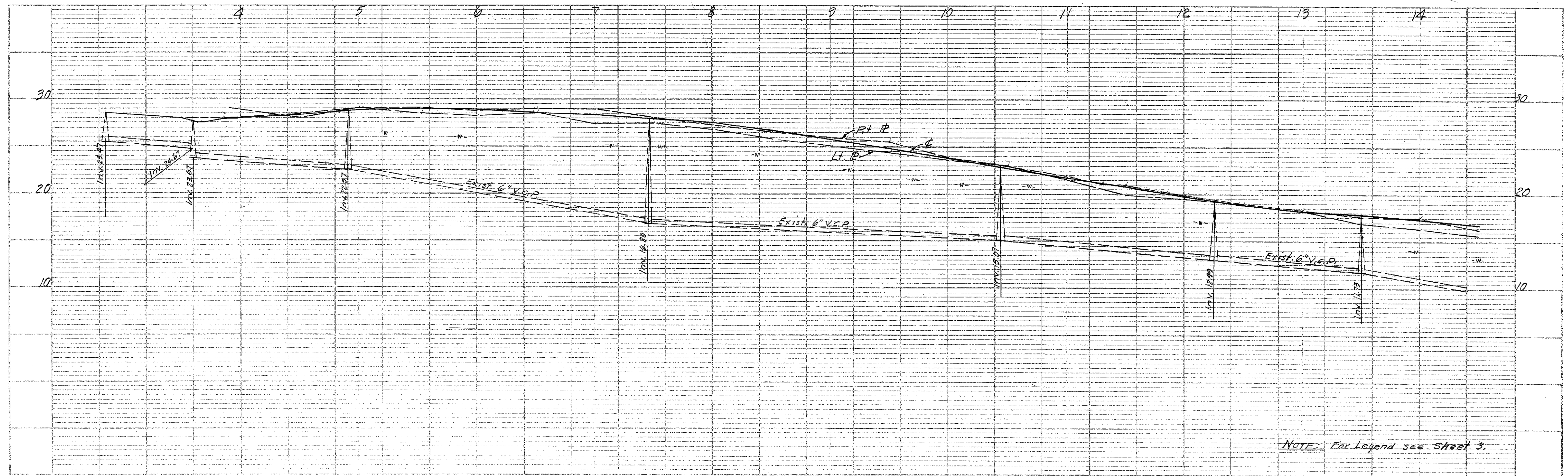
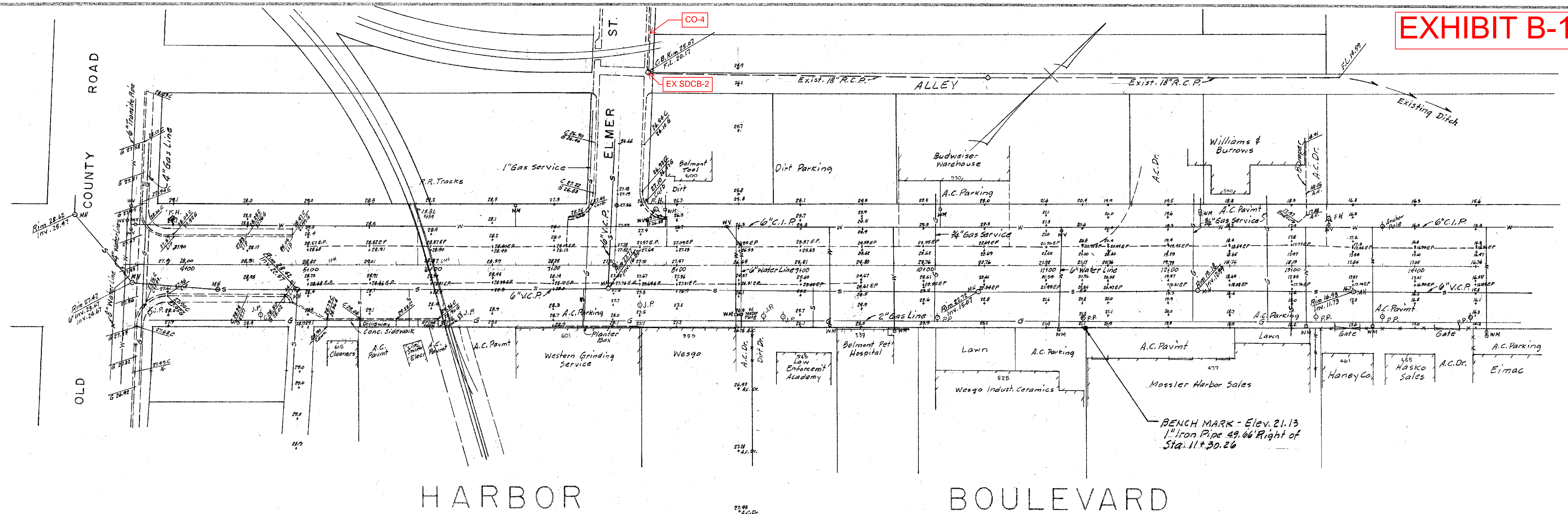
The project will decrease the runoff to the County system by implementing a cistern that has approximately 13,868 gallons of storage to detain the difference between the post-development and pre-development peak flows. The existing storm drain pipes in Elmer Street and Harbor Boulevard are adequate to receive flow from the site.

ATTACHMENTS

- Exhibit A – C2.02 Existing Conditions
- Exhibit B – Harbor Boulevard Improvement Project Plans
- Exhibit C – Existing Stormwater Catchment Areas
- Exhibit D – Old County Road Catchment Area
- Exhibit E – C5.01 Proposed Utility Plan
- Exhibit F – Redwood City Design Criteria Attachment O
- Exhibit G – San Mateo County IDF Table
- Exhibit H – Storm Drain System Profile and Data



DRAWING NAME: K:\2016\160331_Old_County_Road_Belmont\ENG\TM\C2.02 EXISTING CONDITIONS.dwg
 PLOT DATE: 04-16-19
 PLOTTED BY: ymc



NOTE: For Legend see Sheet 3.

Approved May 5, 1967


COUNTY ENGINEER



	BY	DATE
Design		
Drawn	RS	4/66
Checked	WF	4/66
Quantity		
Field Book No.		

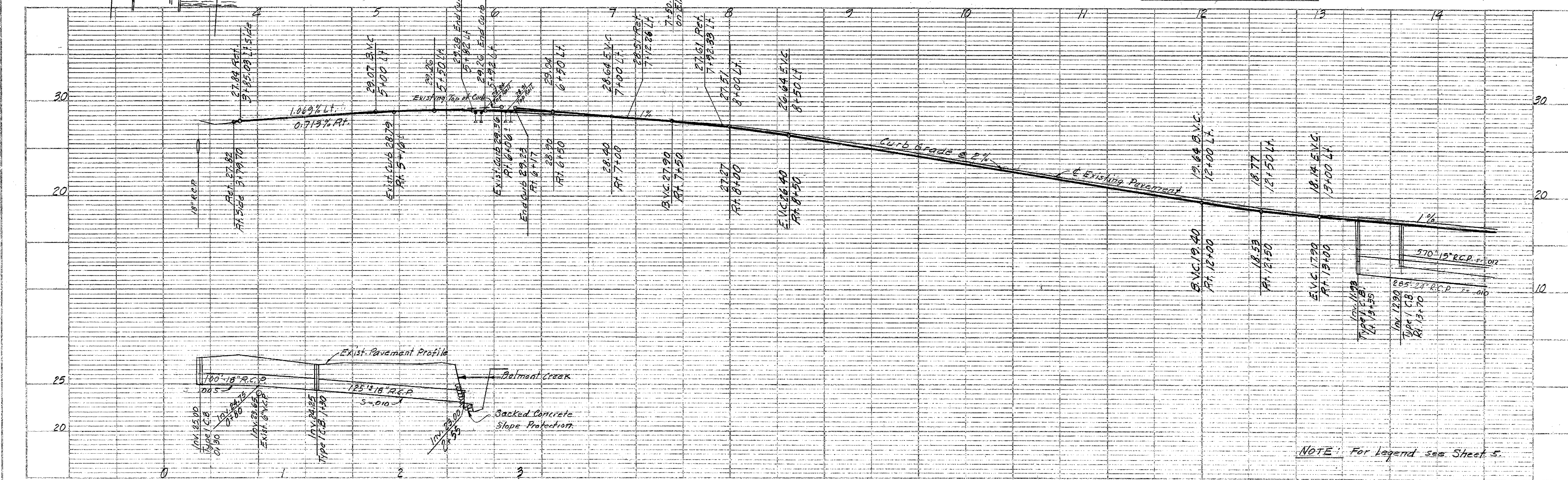
EXISTING CONDITIONS		
HARBOR BOULEVARD IMPROVEMENT PROJECT		
STA. 3+50 TO 14+50		
SAN MATEO COUNTY	CALIFORNIA	SC
JONES · THENN · TILLSON	CIVIL ENGINEERS	C&T
SAN MATEO	CALIFORNIA	C&T

2
OF
5

SCALE: $H 1'' = 40'$
 $V 1'' = 5'$

DATE: May 1967

FILE NO: 66-121 D-1



Design	RY	DATE	
Brown	RS	4/66	
Crafted	WF	5/66	
Survey	SA	4/66	
Filed	MS		

IMPROVEMENT PLAN

HARBOR BOULEVARD IMPROVEMENT PROJECT

STA. 3+50 TO 14+50

SAN MATEO COUNTY

CALIFORNIA

JONES · THENN · TILLSON

CIVIL ENGINEERS

SAN MATEO

CALIFORNIA

4

OF

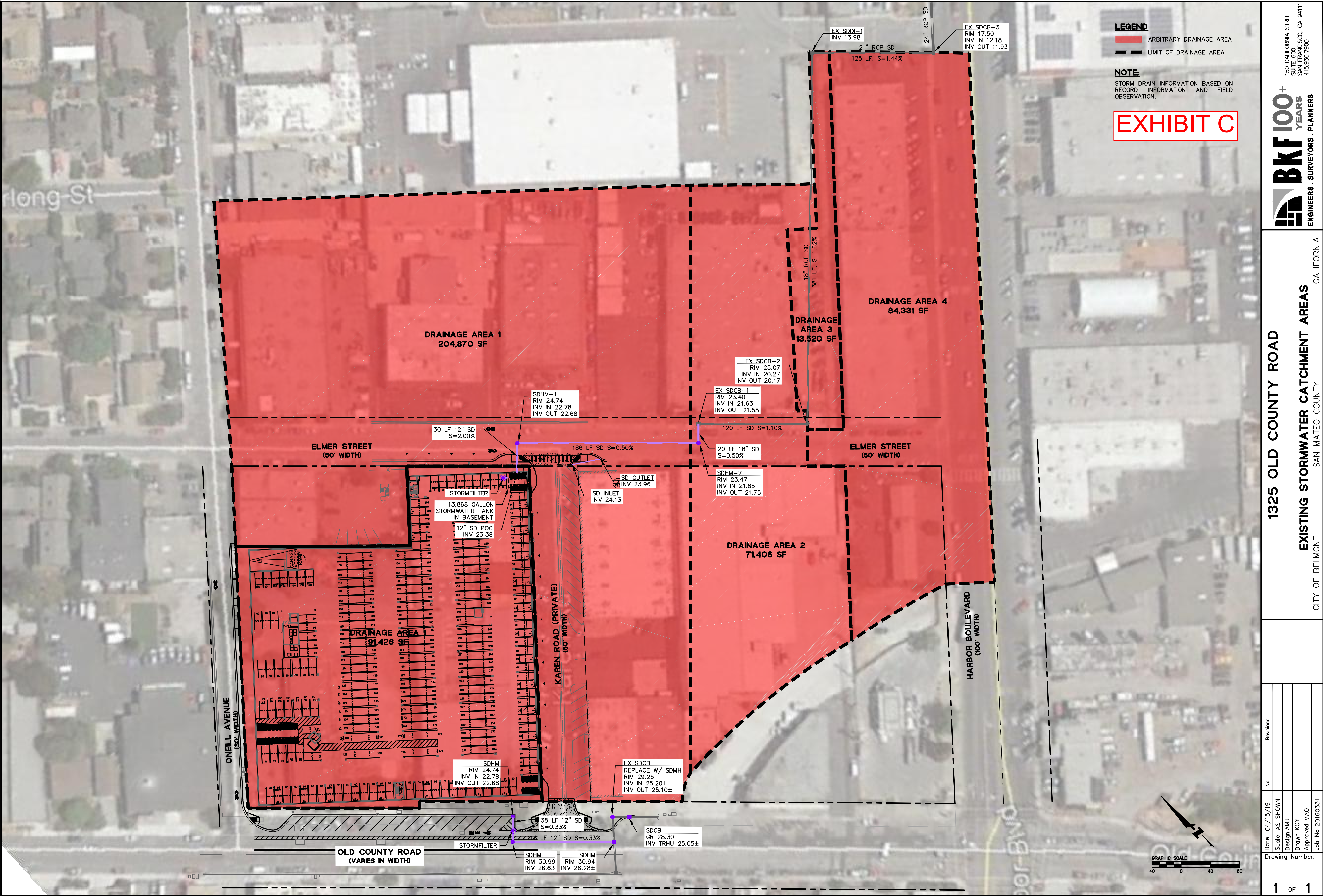
5

SCALE: $H \ 1" = 40'$
 $V \ 1" = 5'$

DATE: May 1967

DWG NO 66-121 D-1

DRAWING NAME: K:\2016\160331_OldCountyRoad_Belmont\ENG\EXHIBITS\19_0412 SD Catchment\19_0416 SD Catchment.dwg
PLOT DATE: 04-16-19 PLOTTED BY: yama



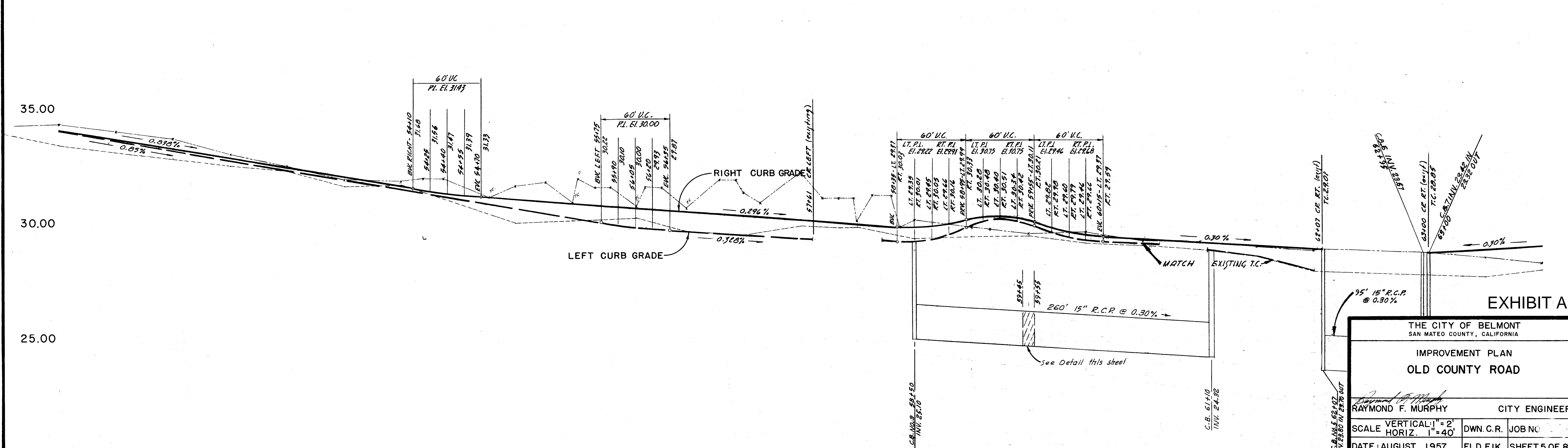
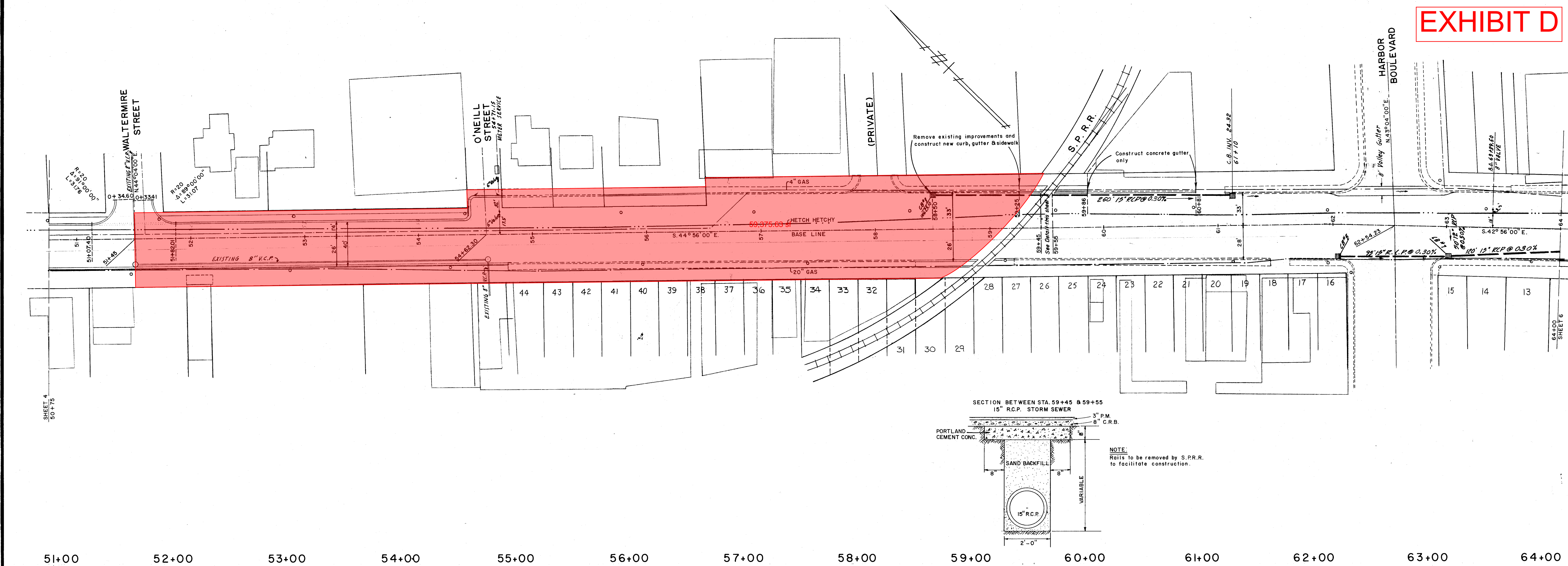


EXHIBIT A

THE CITY OF BELMONT
SAN MATEO COUNTY, CALIFORNIA

IMPROVEMENT PLAN
OLD COUNTY ROAD

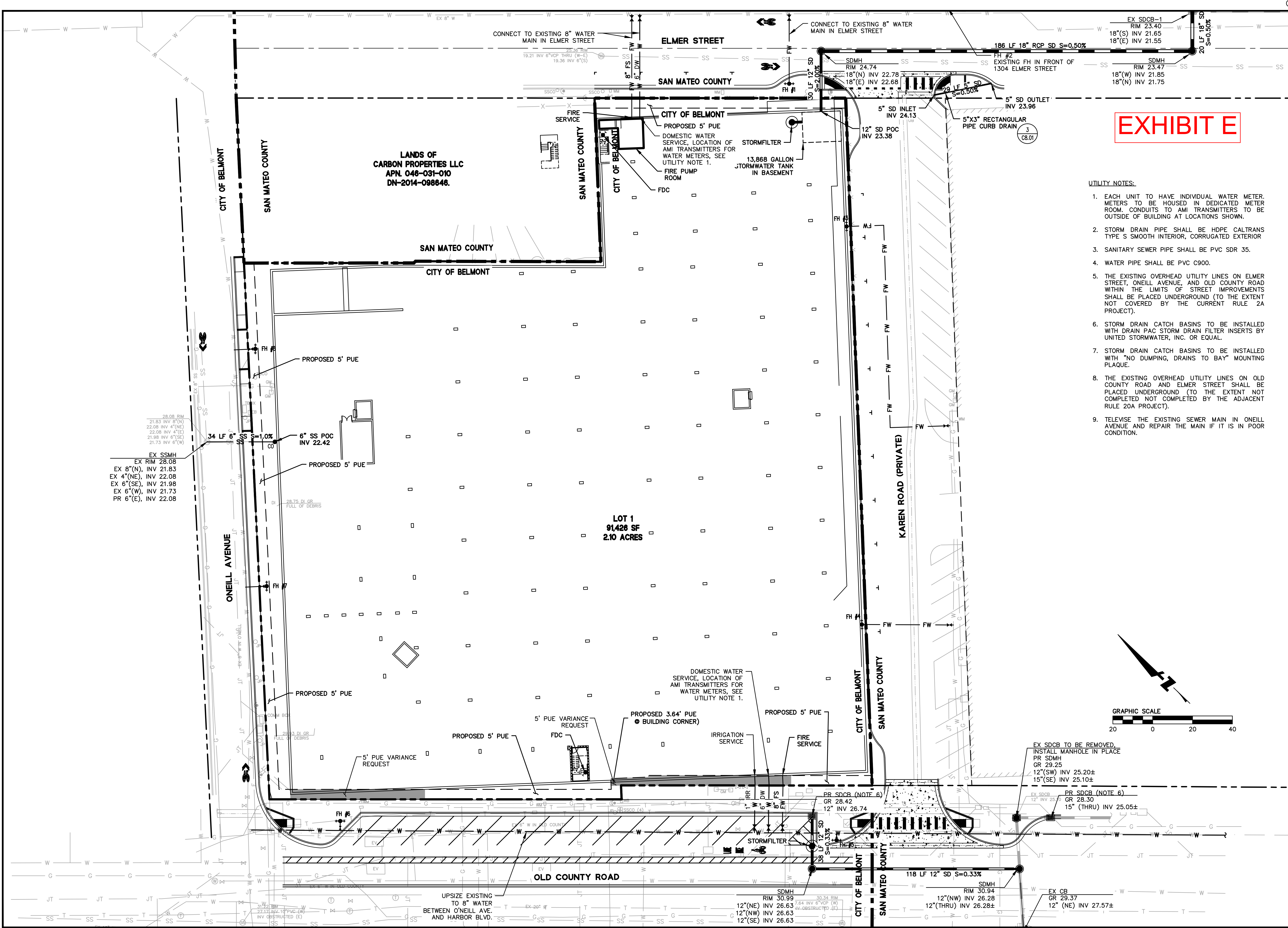
RAYMOND F. MURPHY CITY ENGINEER

SCALE VERTICAL: 1" = 2'
HORIZ. 1" = 40'

DATE: AUGUST, 1957 FLD.EIK SHEET 5 OF 8

C-98404

DRAWING NAME: K:\2016\160331_OldCounty.Road.Belmont\ENGTMA\C5.01 PROPOSED UTILITY PLAN.dwg
PLOT DATE: 04-15-19 PLOTTED BY: yama



UTILITY NOTES:

1. EACH UNIT TO HAVE INDIVIDUAL WATER METER. METERS TO BE HOUSED IN DEDICATED METER ROOM. CONDUITS TO AMI TRANSMITTERS TO BE OUTSIDE OF BUILDING AT LOCATIONS SHOWN.
2. STORM DRAIN PIPE SHALL BE HDPE CALTRANS TYPE S SMOOTH INTERIOR, CORRUGATED EXTERIOR
3. SANITARY SEWER PIPE SHALL BE PVC SDR 35.
4. WATER PIPE SHALL BE PVC C900.
5. THE EXISTING OVERHEAD UTILITY LINES ON ELMER STREET, ONEILL AVENUE, AND OLD COUNTY ROAD WITHIN THE LIMITS OF STREET IMPROVEMENTS SHALL BE PLACED UNDERGROUND (TO THE EXTENT NOT COVERED BY THE CURRENT RULE 2A PROJECT).
6. STORM DRAIN CATCH BASINS TO BE INSTALLED WITH DRAIN PAC STORM DRAIN FILTER INSERTS BY UNITED STORMWATER, INC. OR EQUAL.
7. STORM DRAIN CATCH BASINS TO BE INSTALLED WITH "NO DUMPING, DRAINS TO BAY" MOUNTING PLAQUE.
8. THE EXISTING OVERHEAD UTILITY LINES ON OLD COUNTY ROAD AND ELMER STREET SHALL BE PLACED UNDERGROUND (TO THE EXTENT NOT COMPLETED NOT COMPLETED BY THE ADJACENT RULE 20A PROJECT).
9. TELEWISE THE EXISTING SEWER MAIN IN ONEILL AVENUE AND REPAIR THE MAIN IF IT IS IN POOR CONDITION.

EXHIBIT E



REGISTERED PROFESSIONAL ENGINEER

LUKAS A. O'CONNELL

NO. 75511

EXP. 6/30/20

CIVIL

STATE OF CALIFORNIA

1325 OLD COUNTY ROAD

VESTING TENTATIVE MAP

PROPOSED UTILITY PLAN

CITY OF BELMONT

SAN MATEO COUNTY

150 CALIFORNIA STREET

SUITE 600

SAN FRANCISCO, CA 94111

415.930.7900

ENGINEERS . SURVEYORS . PLANNERS

BKF100+

YEARS

Revisions

No.

Date

12/14/18

Scale AS SHOWN

Design AMJ

Drawn LBN

Approved MAO

Job No 20160331

Drawing Number:

C5.01

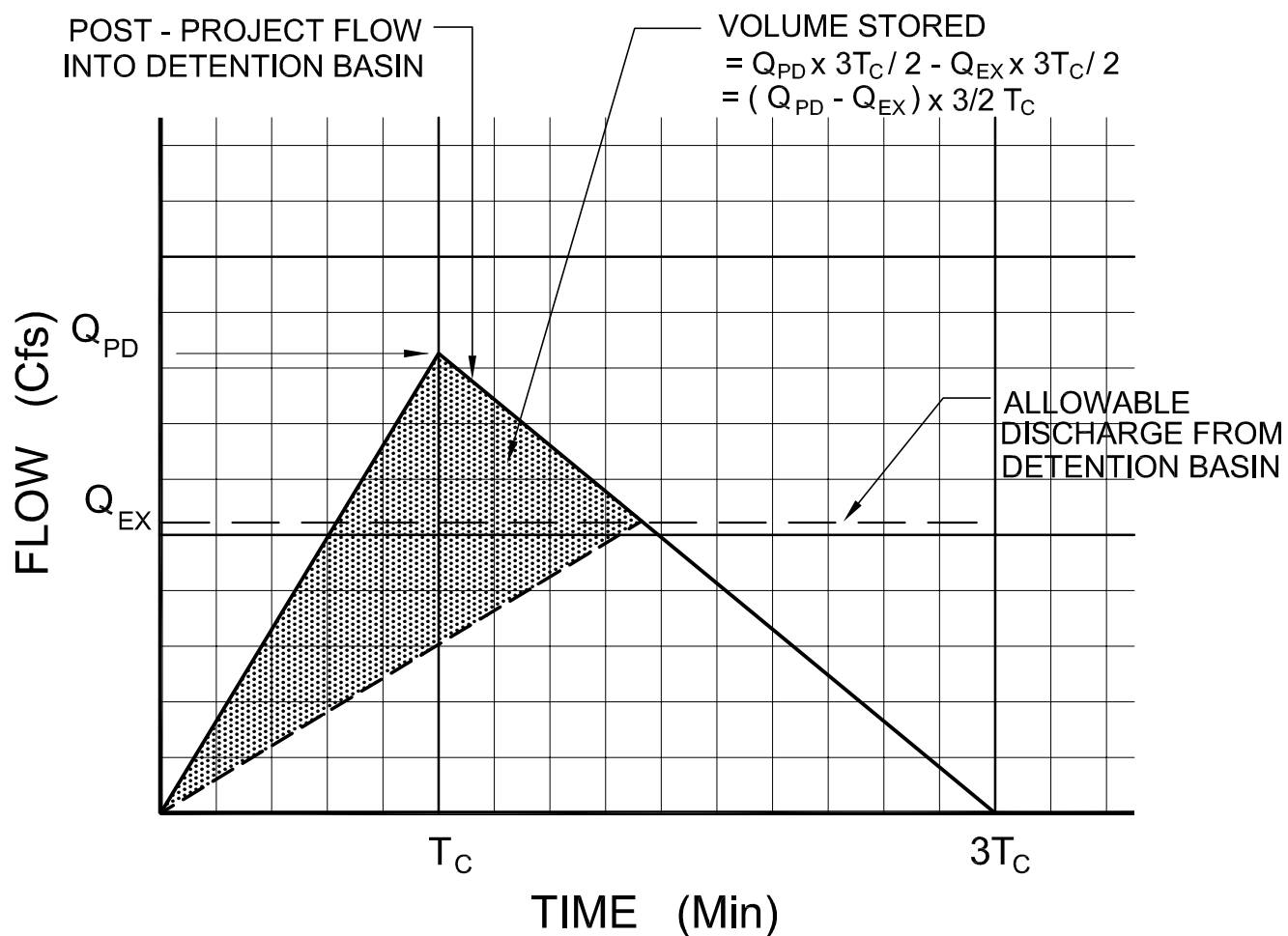
9 OF 18

VESTING TENTATIVE MAP SUBMITTAL #2

ATTACHMENT O

SYNTHETIC UNIT HYDROGRAPH

FOR ESTIMATING POST-DEVELOPMENT STORMWATER STORAGE



$$Q_{PD} = C_{PD} I A$$

$$Q_{EX} = C_{EX} I A$$

PD = POST - DEVELOPMENT CONDITIONS

EX = EXISTING PRE - DEVELOPMENT CONDITIONS

RAINFALL RUNOFF DATA

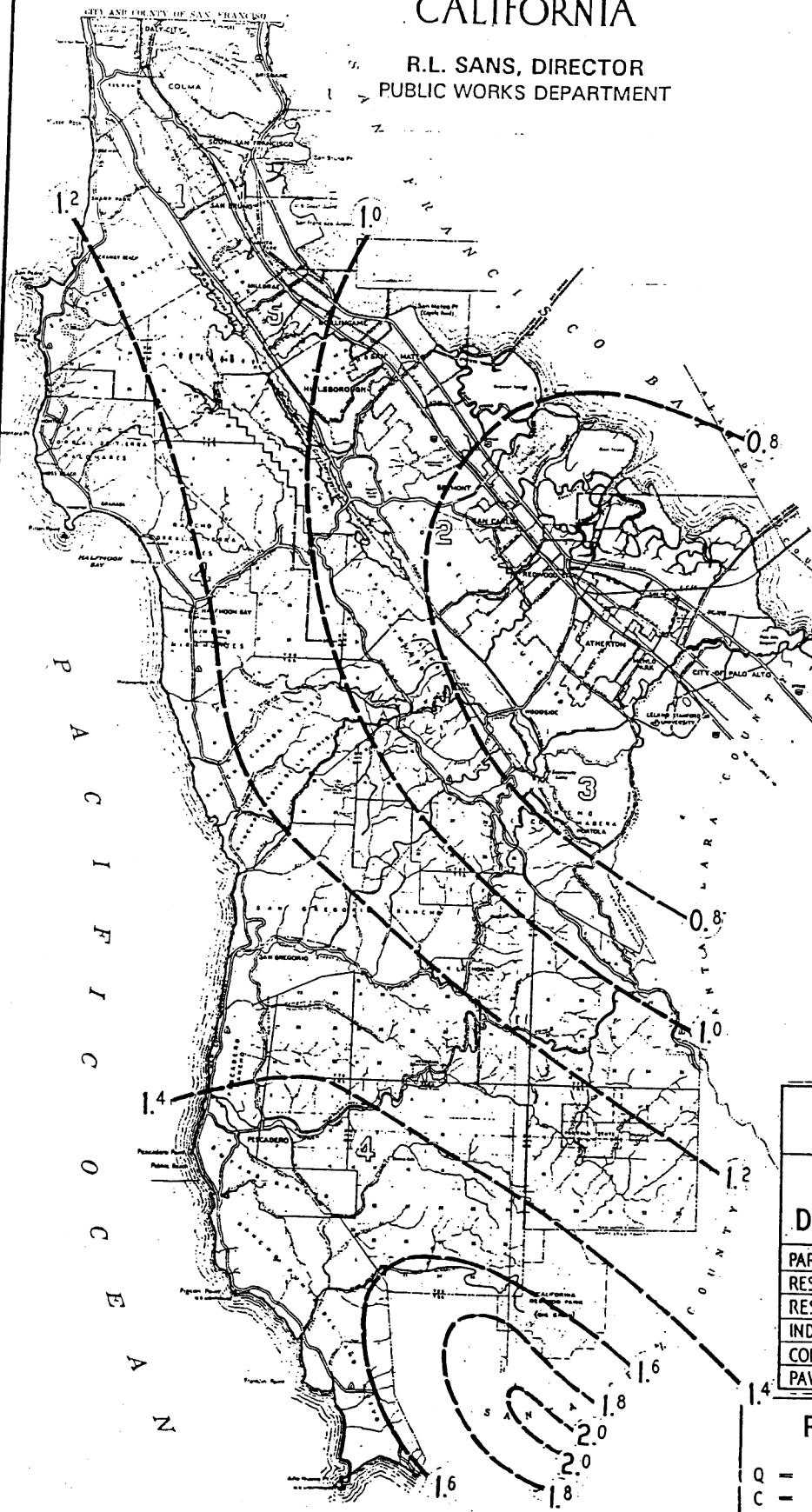
SAN MATEO COUNTY

CALIFORNIA

R.L. SANS, DIRECTOR
PUBLIC WORKS DEPARTMENT



SCALE - MILES
0 1 2 4



RAINFALL			
TIME OF CONCENTRATION		INTENSITY INCHES PER HOUR	
HRS.	MIN.	10 YR.	100 YR.
0	10	2.45	3.60
0	15	2.05	3.00
0	20	1.73	2.55
0	25	1.50	2.22
0	30	1.33	1.95
0	35	1.20	1.75
0	40	1.10	1.61
0	45	1.02	1.49
0	50	0.95	1.37
0	55	0.90	1.28
1	00	0.86	1.21
1	15	0.75	1.07
1	30	0.67	0.95
1	45	0.61	0.87
2	00	0.56	0.80
2	30	0.49	0.70
3	00	0.44	0.63
3	30	0.40	0.57
4	00	0.37	0.53
4	30	0.34	0.49
5	00	0.32	0.45
6	00	0.29	0.41
7	00	0.26	0.38
8	00	0.24	0.35
9	00	0.23	0.33
10	00	0.21	0.30
12	00	0.19	0.27
24	00	0.13	0.18

RUNOFF COEFFICIENTS

TYPE OF DEVELOPMENT	COEF.
PARKS AND CEMETERIES	0.30
RESIDENTIAL - ACRES	0.40
RESIDENTIAL - REGULAR	0.50
INDUSTRIAL	0.65
COMMERCIAL	0.75
PAVED AREAS	0.85

RATIONAL FORMULA

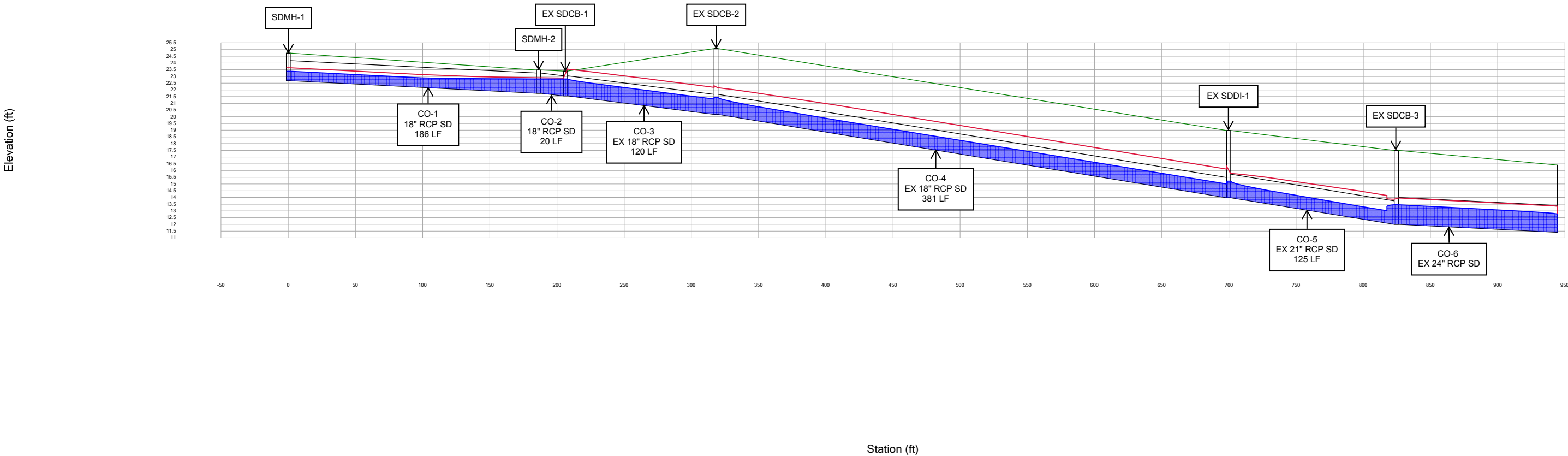
$Q = C \cdot I \cdot A \cdot F$

Q = RUNOFF - CUBIC FEET PER SECOND
C = RUNOFF COEFFICIENT - PERCENT
I = RAINFALL INTENSITY - INCHES PER HOUR
A = DRAINAGE AREA - ACRES
F = INTENSITY FACTOR (FROM MAP)

Dr. 22-1846

Profile Report
Profile: Profile - Storm Drain System

Profile - Storm Drain System - Base



FlexTable: Catch Basin Table													
Label	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Is Rim Higher Than HGL?	Inlet Drainage Area (acres)	Inlet C	Local CA (acres)	System CA (acres)	Total Inlet Tc (hours)	Local Flow Time (hours)	Local Intensity (in/h)	Flow (Total Out) (cfs)
EX SDCB-1	23.40	21.55	22.82	22.82	YES	4.703	0.680	3.198	4.541	0.167	0.167	2.450	10.91
EX SDCB-2	25.07	20.17	21.43	21.43	YES	0.000	(N/A)	0.000	4.541	0.167	0.167	2.450	10.82
EX SDDI-1	18.98	13.98	15.22	15.22	YES	0.310	0.680	0.211	4.752	0.167	0.167	2.450	11.03
EX SDCB-3	17.50	12.00	13.46	13.46	YES	1.936	0.680	1.316	6.068	0.167	0.167	2.450	13.97

FlexTable: Conduit Table																
Label	Start Node	Stop Node	Capacity (Full Flow) (cfs)	Flow (cfs)	Diameter (in)	Length (Scaled) (ft)	Slope (Calculated) (ft/ft)	Manning's n	Invert (Start) (ft)	Invert (Stop) (ft)	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Cover (Start) (ft)	Velocity (ft/s)
CO-3	EX SDCB-1	EX SDCB-2	11.66	10.91	18	112.0	0.012	0.013	21.55	20.17	23.40	25.07	22.82	21.32	0.35	7.50
CO-4	EX SDCB-2	EX SDDI-1	13.38	10.82	18.0	381.4	0.016	0.013	20.17	13.98	25.07	18.98	21.43	15.00	3.40	8.43
CO-5	EX SDDI-1	EX SDCB-3	19.96	11.03	21.0	124.8	0.016	0.013	13.98	12.00	18.98	17.50	15.22	13.46	3.25	8.51
CO-6	EX SDCB-3	O-1	15.87	13.97	24.0	119.9	0.005	0.013	12.00	11.41	17.50	16.41	13.46	12.76	3.50	5.70
CO-1	SDMH-1	SDMH-2	7.42	3.32	18.0	186.3	0.005	0.013	22.68	21.75	24.74	23.47	23.38	22.81	0.56	4.08
CO-2	SDMH-2	EX SDCB-1	10.50	3.23	18.0	20.0	0.010	0.013	21.75	21.55	23.47	23.40	22.81	22.82	0.22	5.23